Remarks

Claims 1, 14, 27 and 32-34 have been amended and claims 2, 10, 15 and 23 have been cancelled. Claims 1, 3-9, 11-14, 16-22 and 24-34 are pending in the application. Applicant respectfully requests reconsideration.

Examiner Interview

Applicant wishes to express his gratitude for the Examiner's time spent on a phone interview held between the undersigned attorney for the Applicant and the Examiner on December 12, 2007. During the interview, the Examiner and the undersigned discussed independent claims 1, 14 and 27. With respect to the "first correlation loss data," the Examiner suggested incorporating the subject matter of claim 10 into claims 1, 14 and 27 to further define "the first correlation loss data." With respect to the "first position data" the Examiner suggested incorporating the subject matter of claim 2 into claims 1, 14 and 27 to further define the "first position data." Applicant has adopted these suggestions in the current amendment. The Examiner and the undersigned also discussed the "first rate of correlation loss" with reference to the example shown in Figs. 5 and 6 of the application.

Claim Objections

Claims 1, 14 and 27 were objected to. According to the Examiner "determining a first rate of correlation loss between the first and second image in a direction using the first correlation loss data" step merely involves the calculation of data from some unknown locations.

Claims 1, 14 and 27 have been amended to incorporate the limitations of claim 2, which recite the first and second images comprising first and second data locations, respectively.

Claim 31 was objected to because of the following informalities: Claim 32 sets forth a method, however the claim is directed to a system.

Claim 32 has been amended to set forth a system instead of a method.

Therefore, Applicant submits that the above claim objections have been overcome.

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Claim Rejections Under 35 U.S.C. 112

Claims 1-34 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject manner which Applicant regards as the invention. More particularly, the Office Action stated that:

> Claims 1, 14, and 27 are directed to determining a rate value by using the correction loss data and lacks clarity as to how this rate value is determined and therefore does not further limit the method, system or the computer.

Claims 1 and 14 have each been amended to recite "wherein determining the first rate of correlation loss comprises determining a rate of change of the first correlation loss data." Claim 27 has been similarly amended. Thus, the claims clearly sets forth that the "first rate of correlation loss" is determined by the rate of change of the first correlation loss data. The rate of change of the first correlation loss data (i.e., the rate at the which the correlation loss data changes) is different from the first correlation loss data, and therefore further limits the claims.

An example of the rate of change of the first correlation loss data is provided in Figs. 5 and 6 of the application. Fig. 5 shows correlation loss data 160, 170 for two different pairs of images. In Fig. 6, the rate of change of each correlation loss data 160, 170 is computed by fitting a function 165, 175 to each correlation loss data 160, 170 and taking the derivate of the function (see, e.g., paragraphs [0028]-[0031]). It is well understood that a derivative of a function computes the rate of change of the function. Since the function 165, 175 fitted to the correlation loss data approximates the correlation loss data 160, 170, the derivative of the function 165, 175 provides the rate of change of the correlation loss data 160, 170. Claim 33 has been amended to claim this example of determining the rate of change of the correlation loss data.

Therefore, Applicant submits that "the first rate of correlation loss" recited in claims 1, 14 and 27 is clearly defined and further limits the claims over "the first correlation loss data."

Claim Rejections Under 35 U.S.C. 103

Claims 1-26 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ferre et al. (U.S. 5,967,980) in view of Sumanaweera et al. (6,159,152). Applicant respectfully traverses.

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Claim 1 is patentable because neither Ferre nor Sumanaweera, taken either alone or in combination, discloses, teaches or suggests determining "a first rate of correlation loss between the first and second image in a direction using the first correlation loss data; wherein determining the first rate of correlation loss comprises determining a rate of change of the first correlation loss data" and "determining a first angle of separation between the first and second images using the first rate of correlation loss" (emphasis added).

Ferre fails to disclose determining correlation loss, much less determining the rate of correlation loss in the manner required by claim 1.

Sumanaweera discloses a system and method of registering ultrasound images. To register a first image relative to a second image, Sumanaweera teaches identifying a feature in the first image, correlating the feature in the first image with the second image in various relative positions, and selecting the relative position that results in the best correlation value (see, e.g., col. 1, lines 50-65, col. 5, line 52 to col. 6, line 7). Thus, Sumanaweera determines the relative position between the first and second images based on the relative position from among the various relative positions tested that results in the best correlation value. Nowhere does Sumanaweera disclose, teach or suggest determining a rate of correlation loss between the two image by determining a rate of change of the correlation values, much less using this rate of correlation loss to determine an angle of separation between the two images.

The method of claim 1 is based on the principle that the rate of change of the correlation loss data between two images is related to the angle of separation between the two images, and therefore can be used to determine the angle of separation. This relationship between the angle of separation between two images and the rate of change of their correlation loss data is neither taught nor suggested by Sumanaweera, much less used by Sumanaweera. Instead of determining an angle of separation between two images using the rate of change of their correlation loss data, Sumanaweera determines the relative position between two images by computing correlation values for various relative positions between the two images, and choosing the relative position from among the various relative positions tested that results in the best correlation value (see, e.g., col. 1, lines 50-65). None of the other cited references make up for these deficiencies in Sumanaweera.

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For at least the reasons given above, Applicant submits that claim 1, and its dependent claims 3-13, are patentable over the cited references.

Claim 14 has been amended to include limitations similar to those of claim 1, and is therefore patentable for the same reasons of claim 1.

Claims 16-22, and 24-26 depend from claim 14, and are therefore patentable for at least the reasons given for claim 14.

Claim Rejections Under 35 U.S.C. 102

Claims 27-31 were rejected under 35 U.S.C. 102(b) as being anticipated by Ferre et al. (U.S. 5,967,980). Applicant respectfully traverses.

Claims 27 has been amended to include limitations similar to those of claim 1, and is therefore patentable for the same reasons of claim 1.

Claims 28-31 depend from claim 27, and are therefore patentable for at least the reasons given for claim 27.

Claims 32-34

Claims 32-34 were not rejected in the Office Action dated July 12, 2007, as being unpatentable over the cited reference.

Claim 32 depends ultimately from claim 27, and is therefore patentable for at least the reasons given for claim 27.

Claim 33 depends from claim 1, and is therefore patentable for at least the reasons given for claim 1. Claim 33 is additionally patentable because none of the cited references discloses, teaches or suggests determining the rate of change of the first correlation loss data by "fitting a function to the first correlation loss data" and "calculating a derivative of the function to determine the rate of change of the first correlation loss data."

Claim 34 depends from claim 2 and is therefore patentable for at least the reasons given for claim 2. Claim 34 is additionally patentable because none of the cited reference discloses or teaches "wherein the first image comprises a first plane and the second image comprises a second plane, the first plane and the second plane being non-parallel to each other."

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Sumanaweera does not disclose or teach determining a first angle of separation between two non-parallel image planes. FIG. 1 of Sumanaweera clearly shows the images 1-4 being on the same plane. Further, FIG. 1 of Sumanaweera shows two adjacent images 1-4 overlapping over a region, which requires that their image planes be parallel. In contrast, the method of claim 34 determines an angle of separation between non-parallel image planes, examples of which are shown in FIG. 8 and 9 of the application.

Conclusion

Prompt and favorable action on the merits of the claims is earnestly solicited. Should the Examiner have any questions or comments, the undersigned can be reached at (949) 567-6700.

The Commissioner is authorized to charge any fee which may be required in connection with this Amendment to deposit account No. 15-0665.

Respectfully submitted,

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